



COMMUNICATIONS INC.

SERVICE MANUAL

MULTI-OPTION SYSTEM

MODEL MA 130,131,163

REGENCY MA-131, 132 & 163

SERVICE INSTRUCTIONS

MULTI-OPTION SYSTEMS

A. GENERAL DESCRIPTION

The Regency multi-option systems are available as a factory installed option or as a field kit for Regency transceivers.

The MA-130 is a time-out timer that limits the maximum time of a single transmission period. The MA-131 is a horn relay driver that when used in conjunction with Regency decoders will give a horn blast when an incoming call is received. The MA-163 is a public address system that allows microphone audio to be broadcast over an external speaker. Incoming radio messages can be monitored on the external speaker.

The options are available as a single, double or triple system built on a standard size option circuit board.

A block diagram of the multi-option system is shown in Figure 1, parts layout in Figure 2 and full schematics are shown in Figures 3, 4 and 5.

B. CIRCUIT DESCRIPTION

MA-130 (Refer to Fig. 1, page 4, Schematic page 7.)

The PTT switch line is fed to the time-out timer at terminal C5 and passes through CR1601, R1501 and applied to C1501. When the PTT switch is keyed and held, C1501 will charge through R1503. The output of IC1501A and IC1501B which are normally low will switch to high until C1501 charges to a voltage higher than Pin 3 of IC1501A. A high output of IC1501B saturates Q1501 allowing a ground at terminal C6 and energizing the antenna/PTT relay. If the PTT switch is held on, C1501 will charge through R1503 until IC1501A and B output switch to low and turn off Q1501 causing antenna relay to de-energize. The maximum transmission period is determined by the value of R1503 and is set for 45 seconds as a factory nominal value. Timer duration periods for values of R1503 are shown on the schematic. If the transmitter is dekeyed before timer cutout, C1501 will discharge through R1502 and CR1502 allowing immediate transmitter reaccess. CR1503 provides reverse voltage protection for Q1501.

MA-131 (Refer to Fig. 1, page 4, Schematic page 8.)

The horn relay driver inputs can be a negative pulse (terminal D2) or a positive pulse (terminal D1). A positive pulse at terminal D1 (or negative pulse at D2) turns on Q1403 (or Q1402) causing a rapid charging of C1403. The positive voltage on C1403 causes Q1404, Q1405 and Q1406 to turn on allowing a ground at terminal D3. The ground at D3 which is wired to horn relay low will result in a horn blast until C1403 discharges through R1407, R1406 and the base of Q1404. The time period for the horn blast is factory set for ten seconds, however other horn blast periods for different values of C1403 are shown on the schematic. Removing the microphone from the hang-up clip ungrounds terminal D5 and allows Q1401 to conduct and a rapid discharge of C1403 through Q1403 will end the horn blast. An option switch is factory wired into the system to disable the horn relay driver circuit.

B. CIRCUIT DESCRIPTION (CONT.)

MA-163 (Refer to Fig. 1, page 4, Schematic page 9.)

RADIO MODE: The MA-163 option is controlled by an option switch on the front panel of the radio. With the switch in the radio mode, receiver audio is fed into terminal A5 and Rx audio switch (CR1702) which is normally biased on and off terminal A6 to the receiver audio circuit. The PTT switch line is fed into terminal C5. When the PTT switch line is grounded Q1701 is turned on causing Q1702 to conduct and allowing a ground at terminal C6 which will energize the antenna relay.

PUBLIC ADDRESS MODE: When the option switch is turned to PA, receiver audio is switched from internal to external speaker. (Note: this option is factory wired to allow radio messages to be monitored over the external speaker. An optional switch or jumper is shown on the schematic that will disable the PA listen function.) Terminal S3 is grounded to disable the transmitter. When the PTT line is keyed, the PA audio switch (CR1701) is biased on and allows microphone audio to pass from terminal A10 to terminal A6. Audio input to A6 is amplified and fed to the external speaker. The PA output level is controlled by R1702. CR1704 provides reverse breakdown voltage protection for A1702.

C. INSTALLATION

Remove the following jumpers from main radio board:

JO201 (MA-163 only)
JO203 (MA-163 only)
JO301 (MA-130, MA-163 only)

Plug the jumper kit onto the option board pins by matching the pin symbols with the sleeves on the receptacles (Fig. 2).

Plug the jumper kit on the main radio board by matching pin symbols with the sleeves on the receptacles (Fig 6).

Mount the option board as indicated in Fig. 6, with the two sheet metal screws supplied, by inserting the screws from solder side of the P.C. board. (Both top and bottom covers will need to be removed.)

When MA-130 and MA-163 are installed together the C5 and C6 lines must be wired in series. Connect C5 on main radio board to C5 on MA-163 and C6 on main radio board to C6 on MA-130.

D. ADJUSTMENT PROCEDURE

MA-130:

Timer duration may be adjusted by changing the value of R1503 as indicated by the table on the schematic, Fig. 3.

MA-131:

Horn blast duration may be adjusted by changing the value of C1403 as indicated by the table on the schematic, Fig. 4.

D. ADJUSTMENT PROCEDURE (CONT.)

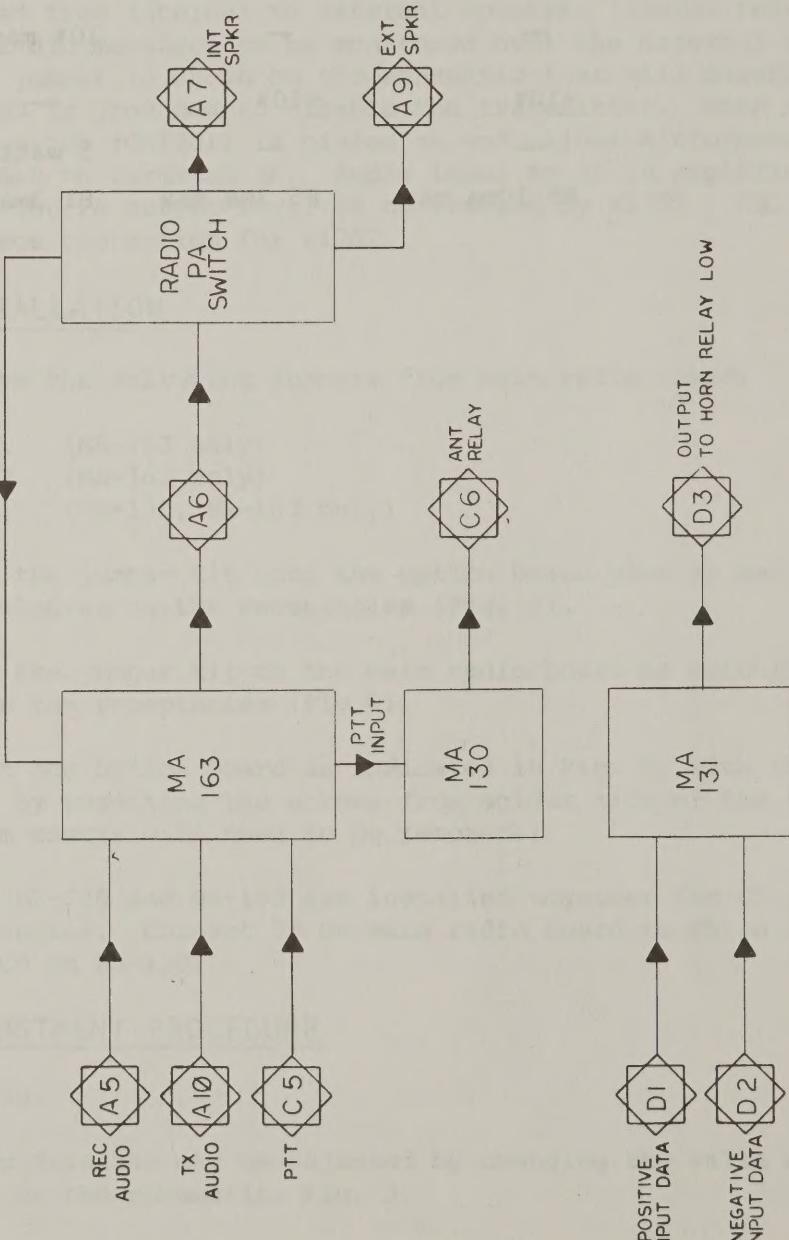
MA-163:

The public address system can be adjusted for audio outputs up to five watts. Apply a 30mv 100Hz signal to pin 4 of the microphone connector and adjust R1702 for desired output level. If feedback occurs between microphone and speaker, readjust R1702 until feedback stops.

E. SPECIFICATIONS

	<u>MA-130</u>	<u>MA-131</u>	<u>MA-163</u>
Distortion	—	—	10% max. @ 1K Hz
Timer Accuracy	+10%	+10%	—
Audio Power	—	—	5 watts
Current Drain	P5 10ma max.	P5 3ma max.	P1 3ma max.

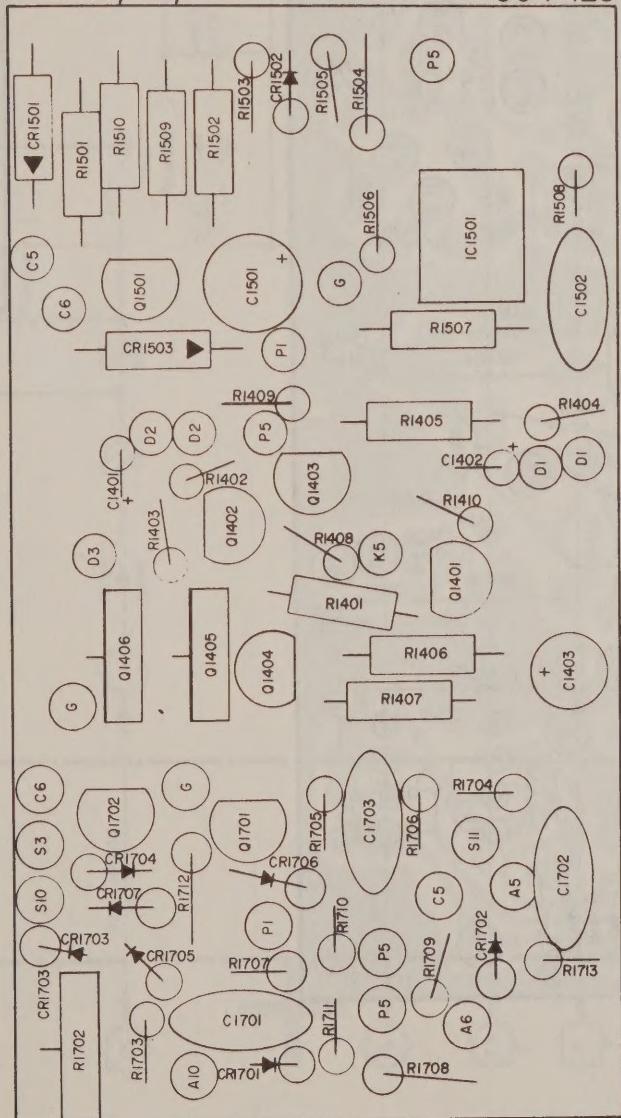
REVISIONS	
ZONE	REV
A	R
	-



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		APPROVALS	DATE
TOLERANCES ARE: PRIM.: DE. ANGLE ± .015° AXL: ± .005"		DRAWN DW	4-7-9
MATERIAL:		CHECKED	
		DFIG SUPV	
		MATERIAL	
MA-130	131	ENGR	
MA-163	FRESH		
NEXT ASSY	USED ON	DO NOT SCALE DWG	SCALE —
APPLICATION		SHEET — OF 1	
FREQUENCY		COMMUNICATIONS INC.	
SATELLITE BEACH, FLORIDA 32957		REV A	
BLOCK DIAGRAM			
MULTI OPTION			
SIZE C PART NUMBER 504-195			

MULTI-OPTION BOARD
MA-130, 131, 163

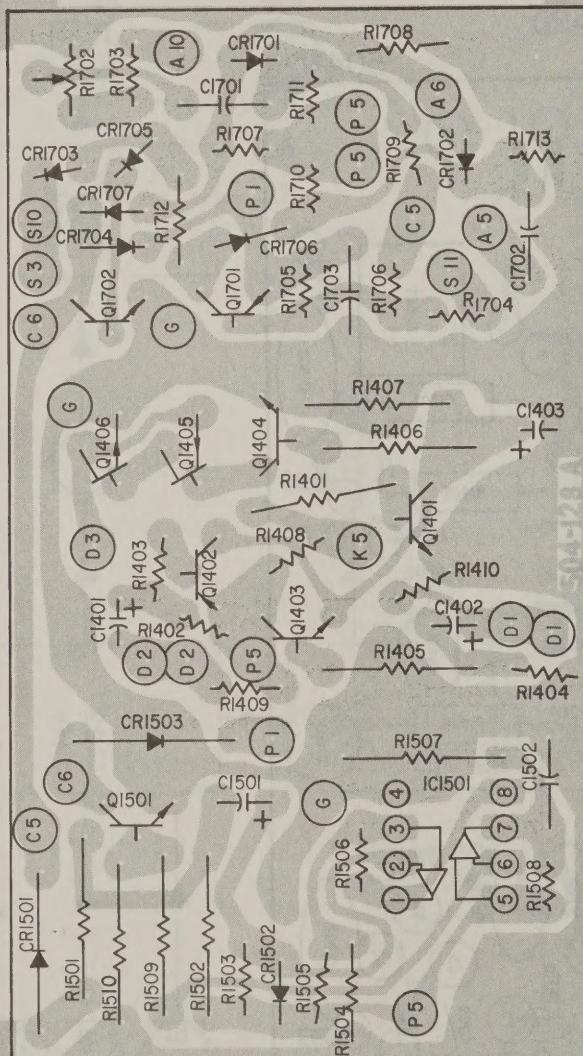
504-128



REF ID: MA-130		REF ID: MA-131		REF ID: MA-163	
DATE: 3/8/78		DATE: 3/8/78		DATE: 3/8/78	
TIME: 10:00 AM		TIME: 10:00 AM		TIME: 10:00 AM	
FACILITY: CMC		FACILITY: CMC		FACILITY: CMC	
REVISIONS: 4		REVISIONS: 4		REVISIONS: 4	
COMMUNICATIONS INC.		COMMUNICATIONS INC.		COMMUNICATIONS INC.	
SATELLITE BEACH, FLORIDA 32837		SATELLITE BEACH, FLORIDA 32837		SATELLITE BEACH, FLORIDA 32837	
PARTS PLACEMENT					
MULTI-OPTION					
C 504-130					
SHEET 1 OF 1					

**MULTI-OPTION BOARD
MA-130, 131, 163**

504-128

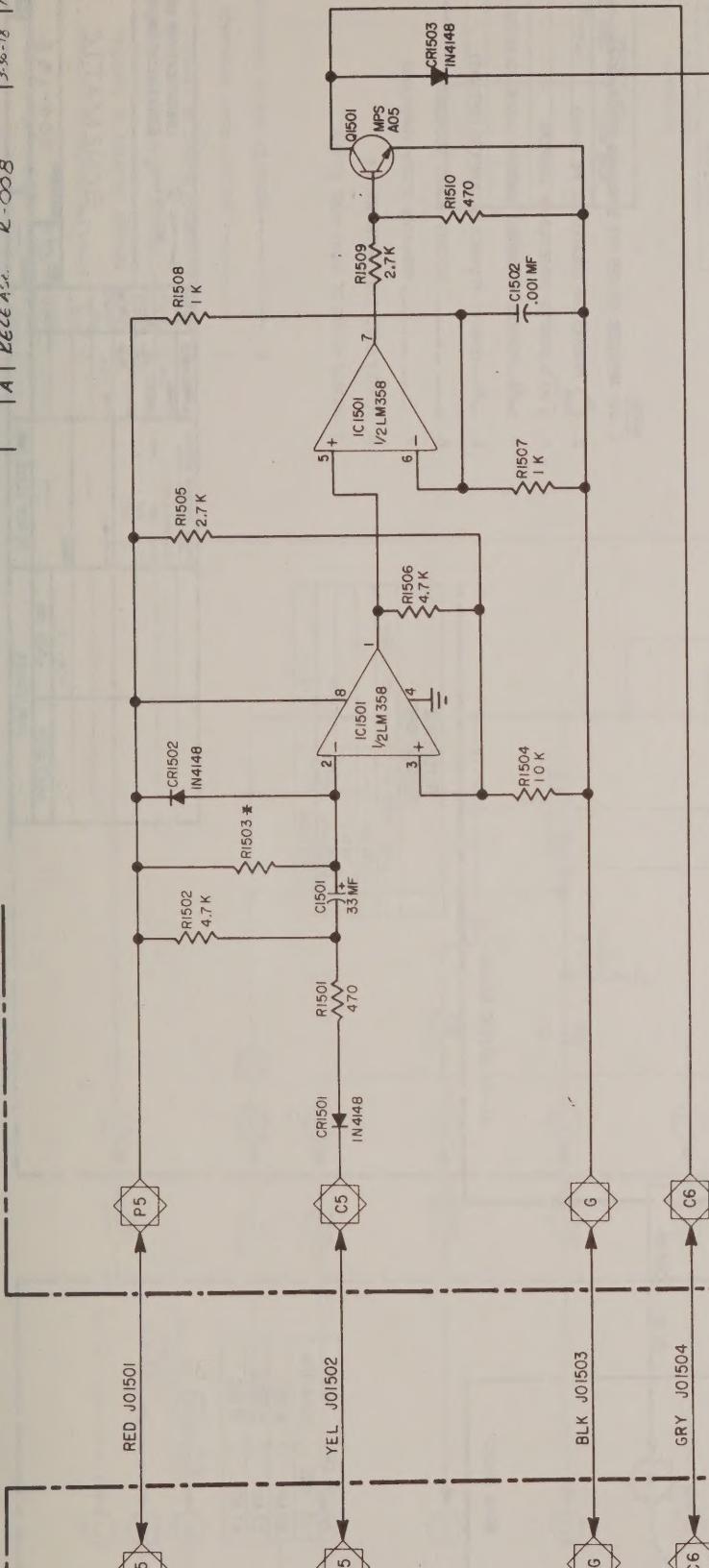


APPROVALS		DATE
DRAWN	D/W	3-78
CHECKED	1/35	3/5/78
DRFT. S/PY.	1/30/78	
ENGR.	Q/24	3/5/78
MATERIAL		
MA-163		
MA-131		
MA-130		
FINISH		
NEXT ASSY	USED ON	

北國風物記

REVISI^N
ZONE REV DESCRIPTION DATE APPROVED

A DEC-64 5-7 R-008 3-30-78 1/8



- NOTES
 1. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 W
 2. DENOTES PIN LOCATED ON PC BOARD
 3. JU O DENOTES HARWDIRED JUMPERS - USER SELECTED
 4. JU O DENOTES PLUGGED IN JUMPERS (OPTIONS)
 5. J.O. INDICATES BOARD BOUNDARIES
 6. INDICATES FACTORY SELECTED VALUE
 7. * INDICATES FACTORY SELECTED VALUE.

REFERENCE DESIGNATIONS	
LAST USED	NOT USED
P1510	
C1502	
C1503	
Q1501	
IC1501	

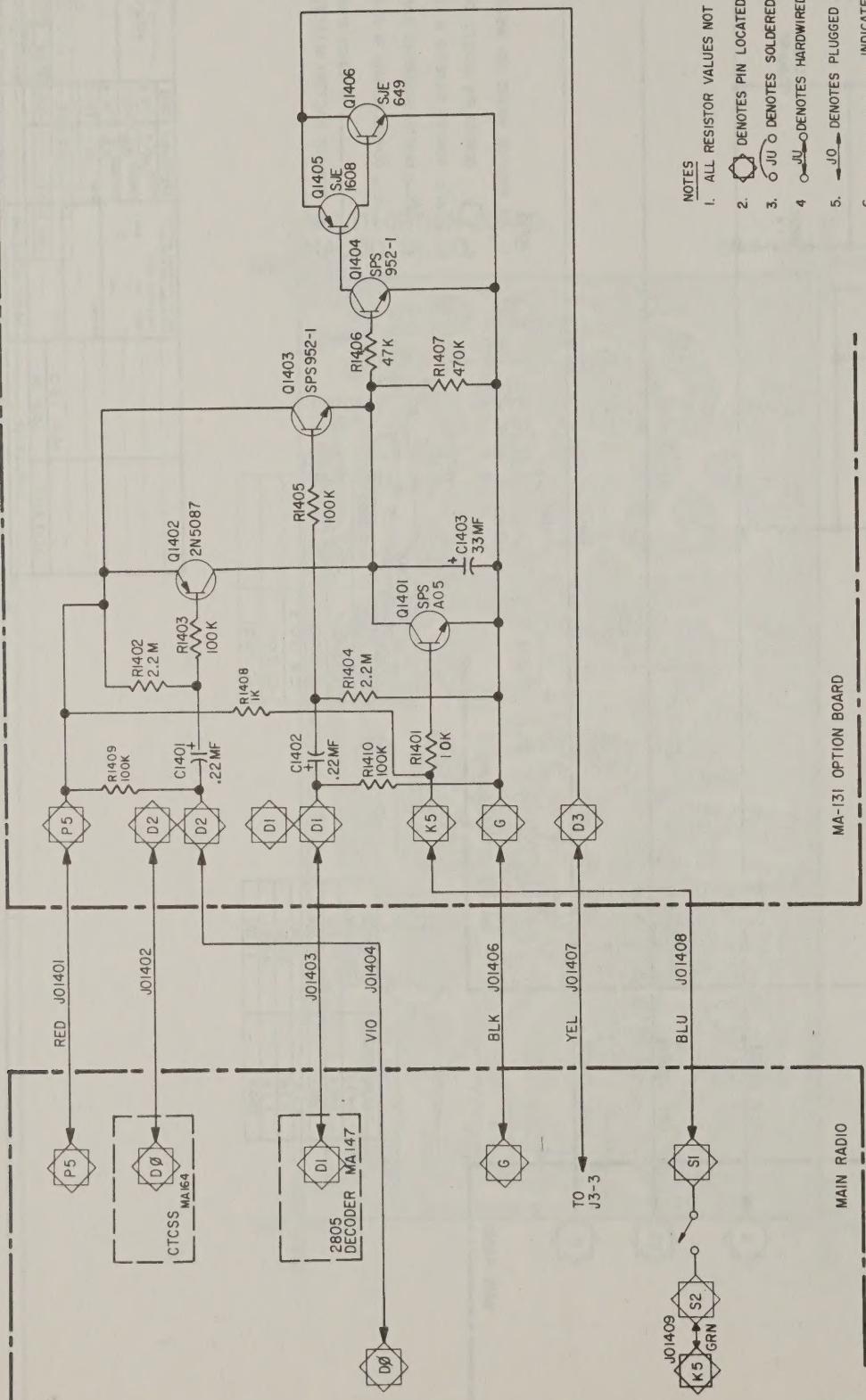
MA-130 OPTION BOARD

MAIN RADIO

VALUE OF	TIMER DURATION	APPROVALS			DATE
		APPROVED	CHANGED	RECHECKED	
R1503	560 K				1/27/78
	30 SEC				1/30/78
I.M	60 SEC				
1.5 M	90 SEC				
2.2 M	120 SEC				
3.3 M	180 SEC				
820 K	45 SEC				

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. FRACTIONAL DIM. ANGLE + OR -	APPROVALS	DATE
COMMISSIONING INC.	APPROVED BY:	1/27/78
COMMUNICATIONS INC.	CHANGED BY:	1/30/78
SATELLITE BEACH, FLORIDA 33477	RECHECKED BY:	1/30/78
	DATA SHEET NO.:	1/27/78
	EXPIRE:	1/31/79
	MATERIAL:	
	FINISH:	
	MA-130	
	USED ON	
NEXT ASSY	MA-130	
APPLICATION	DO NOT SCALE DWG.	
SIZE C	PRINT NUMBER 504-157	SCALE 1:1
DATE	1/27/78	1/30/78

SCHEMATIC



NOTES ALL DECIATOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS. 1/4 W.

2.  DENOTES PIN LOCATED ON PC BOARD.

3.  JU DENOTES SOLDERED IN JUMPERS.

4.  JU DENOTES HARDWIRED JUMPERS - USER SELECTED.

5. JO DENOTES PLUGGED IN JUMPERS (OPTIONS)

6. - - - - - INDICATE BOARD BOUNDARIES.

7. - - - - - INDICATES OPTION VARIATIONS.

8. JO1404 USED ONLY WITH MA164

9. VOLTAGE RATING OF C1403 MUST BE 16V.

REFERENCE DESIGNATIONS		LAST USED	NOT USED
R1410			
L-403			
L-426			
201408			
201415			

VALUE OF C	HORN DURATION
1403	5 SEC
22 MF	10 SEC
33 MF	15 SEC
47 MF	

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE IN INCHES			
			DATE
APPROVALS			
DRAFTER	M/C	10-77	
CHECKER	AB	3/16/78	
DRFG. SUPERV.	MC	7/30/78	
ENGR.	1.7.16	7/30/78	
NEXT ASSY			
APPLICATION		USED ON	DO NOT SCALE DWG.
MA-131		_____	_____

SCHEMATIC

NOTES

- i. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE

2.  DENOTES PIN LOCATED ON P.C. BOARD.

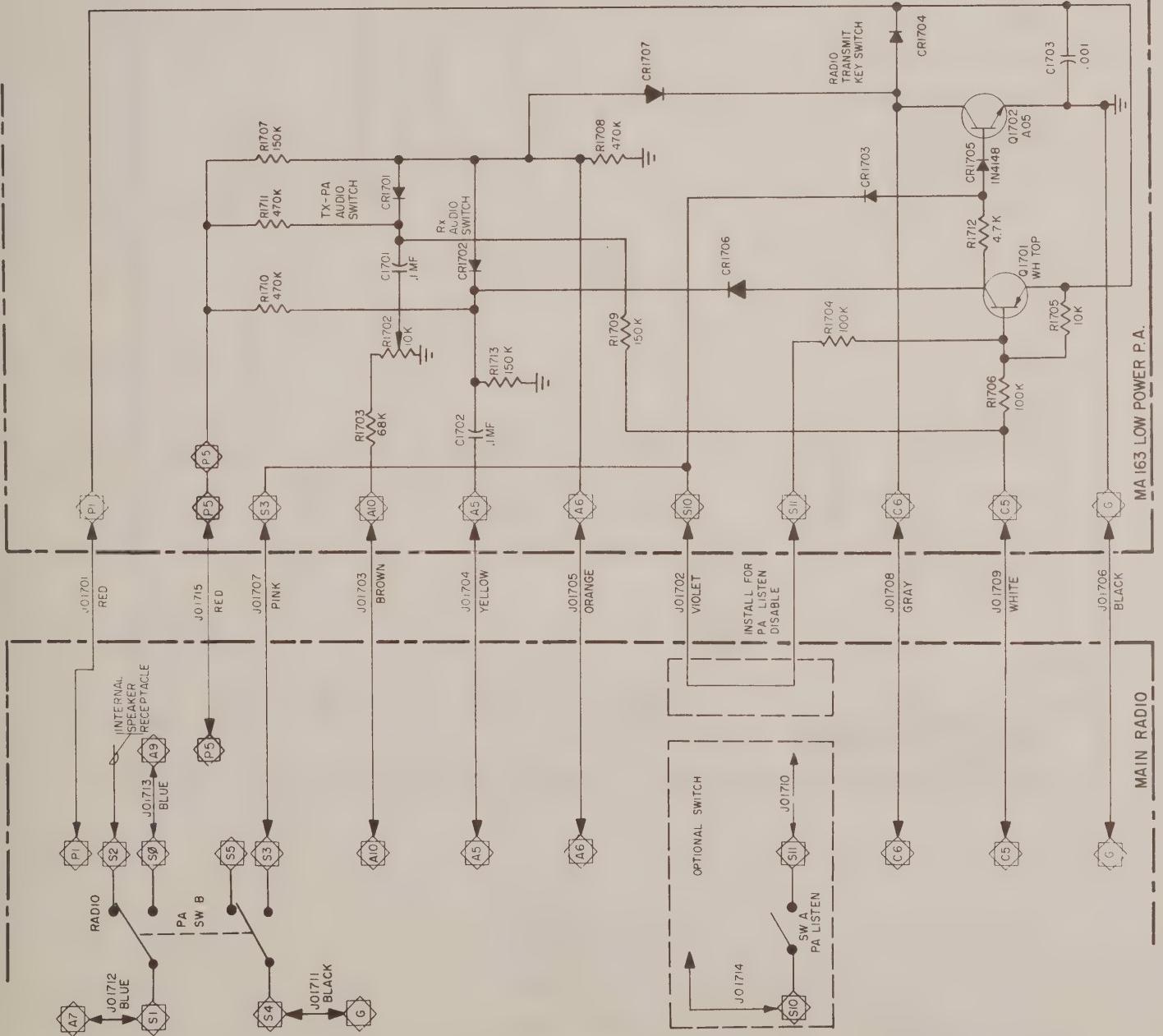
3.  JU DENOTES SOLDERED IN JUMPERS.

5.  JU DENOTES HARDWIRED JUMPERS—USER SELECTED.

6.  JO DENOTES PLUGGED IN JUMPERS.

7.  — INDICATES BOARD BOUNDARIES.

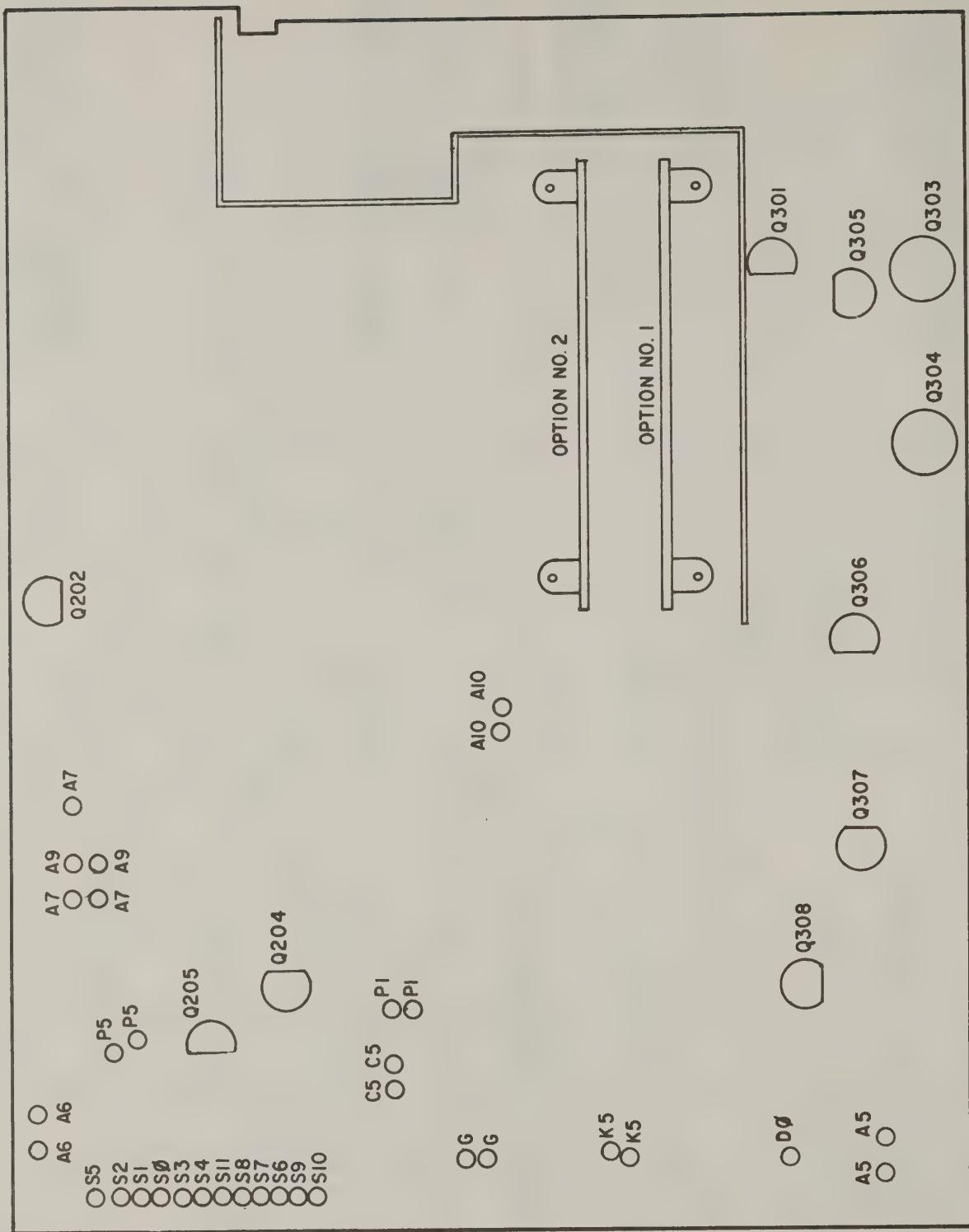
8.  — INDICATES OPTION VARIATIONS.



MR-163
USED ON
APPLICATION
NEXT ASSY

REFERENCE DESIGNATIONS		LAST USED	NOT USED	APPROVE
ZONE	REV	DESCRIPTION	DATE	APPROVE
R	1713		R 1701	
C	1703			
Q	702			
C	R 17			
J	O 1715			
REVISIONS		DESCRIPTION	DATE	APPROVE
A	RELEASE	R-008	3-20-78	MB CO

APPROVALS	DATE	COMMUNICATIONS INC.	SIZE
DRAFTER	1/23/88	FREQUENCY	C PART NUMBER
checked 1/23	3/19/88	SATELLITE BEACH, FLORIDA 33087	5004-159
DRFT SUB J/S	3/19/88	SCHEMATIC	REV A
EDITION		LOW POWER PL.	PRINT 1/21



PARTS LIST

MA-130, MA-131, MA-163

MA-130

RESISTORS (All Resistors are $\pm 10\%$, $\frac{1}{4}W$, unless otherwise noted.)

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
R1501	470 ohm	4701-0471-042
R1502	4.7K	4701-0472-042
R1503	820K	4701-0824-042
R1504	10K	4701-0103-042
R1505	2.7K	4701-0272-042
R1506	4.7K	4701-0472-042
R1507	1K	4701-0102-042
R1508	1K	4701-0102-042
R1509	2.7K	4701-0272-042
R1510	470 ohm	4701-0471-042

CAPACITIORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
C1501	33mf 10V(Tant)	1515-0330-002
C1502	.001mf(Disc)	1503-0102-003

TRANSISTORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
Q1501	Sil NPN	4801-0000-005

DIODES

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
CR1501	Diode Sil	4805-1241-200
CR1502	Diode Sil	4805-1241-200
CR1503	Diode Sil	4805-1241-200

MA-131

RESISTORS (All Resistors are $\pm 10\%$, $\frac{1}{4}W$, unless otherwise noted.)

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
R1401	10K	4701-0103-042
R1402	2.2M	4701-0225-042
R1403	100K	4701-0104-042
R1404	2.2M	4701-0225-042
R1405	100K	4701-0104-042
R1406	47K	4701-0473-042
R1407	470K	4701-0474-042
R1408	1K	4701-0102-042
R1409	100K	4701-0104-042
R1410	100K	4701-0104-042

CAPACITORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
C1401	.22mf 20V 10% (Tant)	1515-0228-009
C1402	.22mf 20V 10% (Tant)	1515-0228-009
C1403	33mf 10V (Tant)	1515-0330-042

TRANSISTORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
Q1401	Sil NPN	4801-0000-005
Q1402	Sil PNP	4801-0000-036
Q1403	Sil NPN	4801-0000-013
Q1404	Sil NPN	4801-0000-013
Q1405	Sil PNP	4802-0000-003
Q1406	Sil NPN	4802-0000-002

MA-163RESISTORS (All Resistors are $\pm 10\%$, $\frac{1}{4}W$, unless otherwise noted.)

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
R1701 (not used)		
R1702	10K Var	4751-0103-002
R1703	68K	4701-0683-042
R1704	100K	4701-0104-042
R1705	10K	4701-0103-042
R1706	100K	4701-0104-042
R1707	150K	4701-0154-042
R1708	470K	4701-0474-042
R1709	150K	4701-0154-042
R1710	470K	4701-0474-042
R1711	470K	4701-0474-042
R1712	4.7K	4701-0472-042
R1713	150K	4701-0154-042

CAPACITORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
C1701	.1mf +8-2% 50V(Disc)	1503-0104-010
C1702	.1mf +8-2% 50V(Disc)	1503-0104-010
C1703	.001mf +8-2% 50V(Disc)	1503-0102-003

TRANSISTORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
Q1701	Sil PNP	4801-0000-060
Q1702	Sil NPN	4801-0000-005

DIODES

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
CR1701	Diode Sil	4805-1241-200
CR1702	Diode Sil	4805-1241-200

(MA-163, DIODES, Cont.)

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>PART #</u>
CR1703	Diode Sil	4805-1241-200
CR1704	Diode Sil	4805-1241-200
CR1705	Diode Sil	4805-1241-200
CR1706	Diode Sil	4805-1241-200
CR1707	Diode Sil	4805-1241-200

CAPACITORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>CAPACITORS</u>
CR1401	2.2 uF 400V (D102)	1515-0122-0001
CR1402-0100-0202	10000PF 400V (D102)	1515-010000-0202
CR1403-0100-0201	10000PF 400V (D102)	1515-010000-0201
CR1404-0100-0201	10000PF 400V (D102)	1515-010000-0201

TRANSISTORS

<u>LOCATION</u>	<u>DESCRIPTION</u>	<u>TRANSISTORS</u>
Q1401	SILICON	4805-0000-0001
Q1402-0000-1001	SILICON	4805-0000-0001
Q1403-0000-1001	SILICON	4805-0000-0001
Q1404	SILICON	4805-0000-0001
Q1405	SILICON	4805-0000-0001
Q1406	SILICON	4805-0000-0001
Q1407	SILICON	4805-0000-0001
Q1408	SILICON	4805-0000-0001
Q1409	SILICON	4805-0000-0001
Q1410	SILICON	4805-0000-0001